WHAT IS CLAIMED IS:

1. A method of operating a fuel cell stack and chemical hydride hydrogen generation system with a catalyst including a reactor for generating hydrogen for the fuel cell stack and controlling the temperature of the fuel cell stack and the chemical hydride generation system, the method comprising the steps of:

1) supplying a chemical hydride solution to the reactor, and permitting the catalyst to catalyze reaction of the chemical hydride solution to generate hydrogen;

2) supplying the hydrogen to the fuel cell stack and supplying an oxidant to the fuel cell stack, for generation of electricity;

3) circulating a heat transfer fluid through the fuel cell stack and the chemical hydride generation system, to effectively transfer heat therebetween.

2. A method as claimed in claim 1, wherein in step (3) on initial startup, the method includes permitting heat generated in the reactor to heat up the heat transfer fluid, passing the heated fluid through the fuel cell stack to promote heating of the fuel cell stack while permitting heat generated in the fuel cell stack to heat up the fluid, and circulating the fluid back to the reactor, thereby bringing the fuel cell stack and the reactor to respective optimum operating temperatures.

3. A method as claimed in claim 1 or 2, further includes passing the heat transfer fluid circulated through the fuel cell stack and the chemical hydride hydrogen generation system through a heat exchanger, and operating the heat exchanger to control the temperature of the chemical hydride solution.

4. A method as claimed in claim 3, which includes actuating the heat exchanger to maintain chemical hydride solution at a desired temperature once the reactor and the fuel cell stack reach desired operating temperatures.

5. An energy system comprising:

a fuel cell stack for generating electricity from hydrogen and an oxidant to form

water;

a chemical hydride hydrogen generation system, comprising:

a storage means for storing a chemical hydride solution comprising a solution of a chemical hydride solute in a solvent;

a reactor containing a catalyst, for catalyzing reaction of the chemical hydride to generate hydrogen;

a first pump means connected between the storage means and the reactor in a first circuit, for circulating the chemical hydride solution through the storage means and the reactor, so that the chemical hydride reacts to generate hydrogen in the presence of the catalyst;

a first connection between the chemical hydride generation system and the fuel cell stack for supplying hydrogen to the fuel cell stack; and

a heat transfer circuit including second connections between the chemical hydride generation system and the fuel cell stack, for circulation of a heat transfer fluid through the fuel cell stack to effect heat transfer between the fuel cell stack and the chemical hydride solution.

6. An energy system as claimed in claim 5, which includes means for controlling the temperature in the heat transfer circuit.

7. An energy system as claimed in claim 6, where said means for controlling the temperature comprises a heat exchanger.

8. An energy system as claimed in claim 7, wherein the heat exchanger includes a fan for forcing cooling air through the heat exchanger to effect heat transfer.

9. An energy system as claimed in claim 8, which includes an auxiliary heater for heating the heat transfer fluid in the heat transfer circuit.

10. An energy system as claimed in claim 9, which includes a second pump means in the heat transfer circuit for circulating the heat transfer fluid therethrough.

11. An energy system as claimed in claim 10, which includes a temperature transducer in the heat transfer circuit, connected to at least the second pump means, for controlling the second pump means.

12. An energy system as claimed in claim 11, wherein the temperature transducer is connected to the fan for actuating the fan in dependence upon the sensed temperature.

13. An energy system as claimed in claim 10, 11 or 12, wherein the reactor includes a heat transfer element and wherein the second connections are made to the heat transfer element of the reactor.

14. An energy system as claimed in claim 10, which includes a gas and liquid separator is provided in the first circuit, between the reactor and the storage means for separating generated hydrogen from the chemical hydride solution, wherein the separator includes an outlet for hydrogen, and wherein said first connection is provided between said outlet for hydrogen and the fuel cell stack.

15. An energy system as claimed in claim 14, wherein the fuel cell stack includes a hydrogen inlet and a hydrogen outlet, and wherein a liquid-gas separator is connected to the hydrogen outlet for separating water from exhausted hydrogen and wherein a return line is provided between the hydrogen outlet and the chemical hydride storage means, for supplying separated water to the chemical hydride solution.

16. An energy system as claimed in claim 15 , wherein the fuel cell stack includes a hydrogen inlet and a hydrogen outlet, and wherein a recirculation duct is connected between the hydrogen outlet and the hydrogen inlet of the fuel cell stack and wherein a third pump means is provided in the recirculation duct, for recirulating hydrogen from the hydrogen outlet to the hydrogen inlet of the fuel cell stack.

17. An energy system as claimed in claim 16, which includes a hydrogen vent connected through a valve to the hydrogen outlet to the fuel cell stack.

18. An energy system as claimed in claim 17, wherein the hydrogen vent is connected to a catalytic burner and wherein the catalytic burner is provided with an inlet for an oxidant, for consuming excess, vented hydrogen.

19. An energy system as claimed in claim 14, which includes an aerosol filter provided in said first connection, for filtering aerosol particles out of the hydrogen flow upstream from the fuel cell stack.

20. An energy system as claimed in claim 10, wherein the fuel cell stack includes an oxidant inlet and an oxidant outlet, wherein a main oxidant inlet is connected by an oxidant inlet line to the oxidant inlet of the fuel cell stack, a fourth, oxygen pump is provided in the oxidant inlet line, an oxidant exhaust line is connected to the oxidant outlet, and wherein an enthalpy exchange device is provided between the oxidant inlet line and the oxidant exhaust line for transfer of enthalpy between an incoming oxidant stream and an exhaust oxidant stream.

21. An energy system as claimed in claim 14, which includes a first level switch on the separator, for the level of chemical hydride solution in the separator and a level control valve connected between the separator and the storage means and to the first level switch, the level control valve being actuated to maintain a desired level of the chemical hydride solution within the separator.

22. An energy system as claimed in 21, which includes second level switch on the storage means and connected to the first pump means for control thereof.

23. An energy system as claimed in claim 22, which includes a pressure transducer connected for monitoring the pressure of generated hydrogen, a pressure controller connected to the pressure transducer and to the first pump means, for controlling the first pump means, to control the pressure of generated hydrogen.

24. An energy system as claimed in claim 10, 14, 20 or 23, wherein the fuel cell stack comprises a plurality of individual fuel cells, and wherein coolant ducts are provided between the fuel cells and connected in the heat transfer circuit.